

## NATURAL RESOURCES CONSERVATION SERVICE

### CONSERVATION PRACTICE STANDARD

#### Cover Crop

(Acre)

Code 340

#### DEFINITION

Grasses, legumes, forbs, or other herbaceous plants established for seasonal cover and other conservation purposes.

#### PURPOSES

- Reduce erosion from wind and water.
- Increase soil organic matter content.
- Capture and recycle or redistribute nutrients in the soil profile.
- Promote biological nitrogen fixation.
- Increase biodiversity.
- Weed suppression.
- Provide supplemental forage.
- Soil moisture management.
- Reduce particulate emissions into the atmosphere.
- Minimize and reduce soil compaction.

#### CONDITIONS WHERE PRACTICE APPLIES

On all lands requiring vegetative cover for natural resource protection and or improvement.

Commercial Harvest for grain is not a purpose of this practice standard.

Use of this standard will comply with all applicable federal, state, and local laws and regulations.

#### CRITERIA

##### General Criteria Applicable to All Purposes

Plant species, seeding rates, and seeding dates will be established according to Table 1.

Plant or drill cover crop seeds between ¼ to ½ inches deep for legumes and grasses such as annual ryegrass and up to 1½ inches for cereal grains.

If seeding the cover crop prior to harvest of the primary crop, broadcast the seed by a method that allows for good coverage of the area and does the least amount of crop damage to the standing crop. Seeding dates shall be prior to leaf drop on the primary crop. No seedbed preparation is necessary. Following row crop harvest, seed may be either no-tilled or broadcasted into existing residue cover. If the seed is applied by a broadcast method into a prepared seedbed, harrowing or culti-packing will be used to improve seed to soil contact.

The species selected will be compatible with other components of the cropping system.

Cover crops will be terminated by forage harvest, frost, mowing, tillage, crimping, and/or herbicides in preparation for the following crop. Herbicides used with cover crops will be compatible with the following crop.

Use certified seed or seed that has been cleaned and/or is free from noxious weeds.

Cover crop residue will not be burned.

**Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service State Office, or download it from the Field Office Technical Guide for your State.**

**Table 1a - Winter Cover Crops**

Plant Species	Seeding Rate (lbs/Ac of PLS <sup>1,3</sup> )	Seeding Dates	
		North of I-70	South of I-70
Annual Ryegrass	15 - 20	8/15 to 10/1	8/15 to 10/10
<u>Cereal Grains</u> <sup>3</sup>			
Cereal Rye <sup>3</sup>	56 - 84	8/1 to 10/31	8/15 to 11/10
Winter Wheat <sup>3</sup>	60 - 90	FFD <sup>2</sup> to 10/15	FFD <sup>2</sup> to 10/31
Spring Oats <sup>3</sup>	32 - 48	8/15 to 9/15	8/15 to 9/30
Winter Triticale <sup>3</sup>	75	8/1 to 10/15	8/15 to 10/31
<u>Legumes</u> <sup>4</sup>			
Hairy Vetch <sup>4</sup>	30	8/1 to 9/15	8/1 to 9/30
Field Peas/ Winter Peas <sup>4</sup>	50 drilled, 70-90 broadcast	8/1 to 9/15	8/1 to 9/30
Cow Peas <sup>4</sup>	40 drilled, 70-90 broadcast	7/1 to 9/1	7/1 to 8/15
<u>Mixtures:</u>			
Hairy Vetch and Cereal Rye	20/40	8/15 to 9/15	8/15 to 9/30
Spring Oats and Brassicas	40/3-8	8/15 to 9/15	8/15 to 9/30
<u>Other:</u>			
Brassicas-Rape/Canola/Turnips	4 drilled, 8 broadcast	8/15 to 9/15	8/1 to 9/30
Oil Seed Radish	10 drilled, 12 broadcast	8/15 to 9/15	8/1 to 9/30

**Table 1b - Supplemental Forage for Livestock**

Plant Species	Seeding Rate (lbs/Ac of PLS <sup>1,3</sup> )	Seeding Dates	
		North of I-70	South of I-70
Spring Oats	64 - 96	3/15 to 5/31	3/1 to 5/15
Cereal Rye <sup>3</sup>	60 - 90	8/1 to 9/1	8/15 to 9/15
Winter Wheat <sup>3</sup>	60 - 90	8/1 to 10/15	8/15 to 10/31
Winter Triticale	75 - 120	FFD <sup>2</sup> to 10/15	FFD <sup>2</sup> to 10/31
Sudangrass & Sorghum- Sudangrass	20	8/1 to 10/15	8/15 to 10/31
Red Clover (spring seeded) <sup>4</sup>	3 - 6	5/15 to 6/15	5/1 to 5/31
Turnips	4 drilled, 8 broadcast	3/15 to 5/31	3/1 to 5/15
Rape/Winter Canola	4 drilled, 8 broadcast	3/15 to 9/1	3/1 to 9/1
Kale	4 drilled, 8 broadcast	3/15 to 7/15	3/1 to 8/1
Millets (Pearl, German, Japanese)	15	3/15 to 7/15	3/1 to 8/1
Annual Ryegrass	20	5/15 to 6/15	5/1 to 5/31
Perennial Ryegrass	40	8/1 to 9/1	8/15 to 9/15
Crabgrass, "Red River" ( <i>Digitaria ciliaris</i> )	5	3/15 to 7/15	3/1 to 8/1
		8/1 to 10/15	8/15 to 10/31
		5/15 to 6/15	5/1 to 7/1

**Table 1c - Summer Cover Crops**

Plant Species	Seeding Rate (lbs/Ac of PLS <sup>1,3</sup> )	Seeding Dates	
		North of I-70	South of I-70
Spring Oats <sup>3</sup>	60	3/15 to 5/31	3/1 to 5/15
Annual Ryegrass	15 - 20	3/15 to 6/15	3/1 to 5/31
Sudangrass & Sorghum- Sudangrass	20	5/15 to 6/15	5/1 to 5/31
Red Clover (spring seeded) <sup>4</sup>	3 - 6	3/15 to 5/31	3/1 to 5/15
Red Clover <sup>4</sup>	4 - 6	12/15 to 3/15	12/15 to 2/15
(Frost-seeded into fall planted small grains)			
Buckwheat	30 - 50	6/15 to 7/15	7/1 to 8/1
Millets (Pearl, German, Japanese)	15	5/15 to 7/15	5/1 to 8/1

<sup>1</sup> Pure Live Seed (PLS)

<sup>2</sup> Not to be planted prior to Fly Free Date (FFD).

<sup>3</sup> Use the upper seeding rates of bulk seed for cereal grains that are cleaned but not certified.

<sup>4</sup> Seed size can vary greatly. Rate can be adjusted up for large seed and down for small. Inoculate seed.

### **Additional Criteria to Reduce Erosion from Wind and Water**

Cover crop establishment, in conjunction with other practices, will be timed so that the soil will be adequately protected during the critical erosion period(s).

Plants selected for cover crops will have the physical characteristics necessary to provide adequate protection.

The amount of surface and/or canopy cover needed from the cover crop shall be determined using current erosion prediction technology.

### **Additional Criteria to Increase Soil Organic Matter Content**

Cover crop species will be selected on the basis of producing high volumes of organic material and or root mass to maintain or improve soil organic matter.

The NRCS Soil Conditioning Index (SCI) procedure will be used to determine the amount of biomass required to have a positive trend in the soil organic matter subfactor.

The cover crop will be terminated as late as feasible to maximize plant biomass production, considering the time needed to prepare the field for planting the next crop and soil moisture depletion.

### **Additional Criteria to Capture and Recycle Excess Nutrients in the Soil Profile**

Cover crops will be established and actively growing before the expected period(s) of nutrient leaching.

Cover crop species will be selected for their ability to take up large amounts of nutrients from the rooting profile of the soil.

When used to redistribute nutrients from deeper in the profile up to the surface layer, the cover crop will be killed in relation to the planting date of the following crop. If the objective is to best synchronize the use of cover crop as a green manure to cycle nutrients, factors such as the carbon/nitrogen ratios may be considered to kill early and have a faster mineralization of nutrients to match release of nutrient with uptake by the following cash crop. A late kill may be used if the objectives are to use as a bio-control and maximize the addition of organic matter. The right moment to

kill the cover crop will depend on the specific rotation, weather and objectives.

### **Additional Criteria to Promote Biological Nitrogen Fixation**

Only legumes or legume-grass mixtures will be established as cover crops.

The specific Rhizobium bacteria for the selected legume will either be present in the soil or the seed will be inoculated at the time of planting. Use only fresh inoculant (check the date).

### **Additional Criteria to Increase Biodiversity**

Cover crop species shall be selected that have different maturity dates, attract beneficial insects, increase soil biological diversity, serve as a trap crop for damaging insects, and/or provide food and cover for wildlife.

### **Additional Criteria for Weed Suppression**

Species for the cover crop will be selected for their chemical or physical characteristics to suppress or compete with weeds.

Cover crop residues will be left on the soil surface to maximize allelopathic (chemical) and mulching (physical) effects.

For long-term weed suppression, reseeding annuals and/or biennial species can be used.

### **Additional Criteria to Provide Supplemental Forage**

Species selected will have desired forage traits, be palatable to livestock, and not interfere with the production of the subsequent crop.

Forage provided by the cover crop may be hayed or grazed as long as sufficient biomass is left for resource protection.

### **Additional Criteria for Soil Moisture Management**

Terminate growth of the cover crop sufficiently early to conserve soil moisture for the subsequent crop. Cover crops established for moisture conservation shall be left on the soil surface.

In areas of potential excess soil moisture, allow the cover crop to grow as long as possible to maximize soil moisture removal.

### **Additional Criteria to Reduce Particulate Emissions into the Atmosphere**

Manage cover crops and their residues so that at least 80% ground cover is maintained during planting operations for the following crop.

### **Additional Criteria to Minimize and Reduce Soil Compaction**

Select and manage cover crop species that will produce deep roots and large amounts of surface or root biomass to increase soil organic matter, improve soil structure and increase soil moisture through better infiltration.

### **CONSIDERATIONS**

Avoid cover crop species that harbor or carryover potentially damaging diseases or insects.

For most purposes for which cover crops are established, the combined canopy and surface cover is at nearly 90 percent or greater, and the above ground (dry weight) biomass production is at least 4,000 lbs/acre.

Cover crops may be used to improve site conditions for establishment of perennial species.

Use plant species that enhance forage opportunities for pollinators.

Consider previous herbicide applications for potential herbicide carryover when selecting the species of the cover crop. Of the cover crops, rye is the most tolerant of triazine carryover, followed by wheat, then oats, and lastly legumes. Legumes are extremely sensitive to triazine carryover released by liming low pH soils. Delay seeding legumes for one year if more than 1 pound of triazine was used the previous year.

Winter rye, winter triticale, annual ryegrass and winter wheat are vigorous, competitive cover. These species overwinter and require herbicides or tillage to kill them prior to seed set.

Spring oats, some brassicas and sudangrass will normally winterkill. Early planting of these cover crops is necessary to achieve environmental benefits. This will also reduce the need for a termination operation.

Grasses including the cereal grains are more winter-hardy than legume crops and should be used for fall plantings. Grasses are competitive and generally

require a higher level of management. Grasses respond favorably to available nitrogen.

Legumes, although less winter-hardy, provide alternative benefits to grasses. The carbon-nitrogen ratio of legume residue is less than grasses and breaks down faster. Legumes also utilize available nitrogen and phosphorus. Earlier planting and/ or later termination will maximize these benefits.

The maximum benefit of legumes is obtained if seeded early enough to grow prior to the onset of cold weather. Legumes are ideal to plant after the harvest of winter wheat.

Allelopathic effects have been documented with cereal grains. These crops produce chemical substances that can inhibit the growth or establishment of following crops.

Grazing is a management tool that may be used to improve nutrient cycling particularly with cereal grains. Grazing may also be used to manage residue amounts prior to planting the next crop.

Temporary protection of critical eroding sites may be obtained by planting a cover crop. Grass or grain crops such as spring oats, winter wheat, winter rye, winter triticale, sudangrass, and annual ryegrass provide excellent canopy and ground cover for erosion reduction and provide excellent wind disruption at the soil surface.

Delayed planting of spring crops is not recommended. The cover crop should be controlled up to two weeks prior to the normal planting date of the next planned crop.

### **PLANS AND SPECIFICATIONS**

Plans and specifications will be prepared for the practice site. Plans for the establishment of cover crops shall include:

- Species or species of plants to be established.
- Seeding rates.
- Recommended seeding dates.
- Establishment procedure.
- Planned rates and timing of nutrient application.
- Planned dates for destroying cover crop.

- Other information pertinent to establishing and managing the cover crop.

Plans and specifications for the establishment and management of cover crops may be recorded in narrative form, on job sheets, or on other forms.

### OPERATION AND MAINTENANCE

The cover crop should be managed and maintained as part of a conservation cropping system with practices such as: Continuous No-till/Strip-till, Nutrient Management, Pest Management, Prescribed Grazing and Waste Utilization.

Control growth of the cover crop to reduce competition from volunteer plants and shading.

Control weeds in cover crops by mowing or by using other pest management techniques.

Control soil moisture depletion by selecting water efficient plant species and terminating the cover crop before excessive transpiration.

### REFERENCES

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Figure 1. Indiana Fly Free Seeding Dates for Winter Wheat

